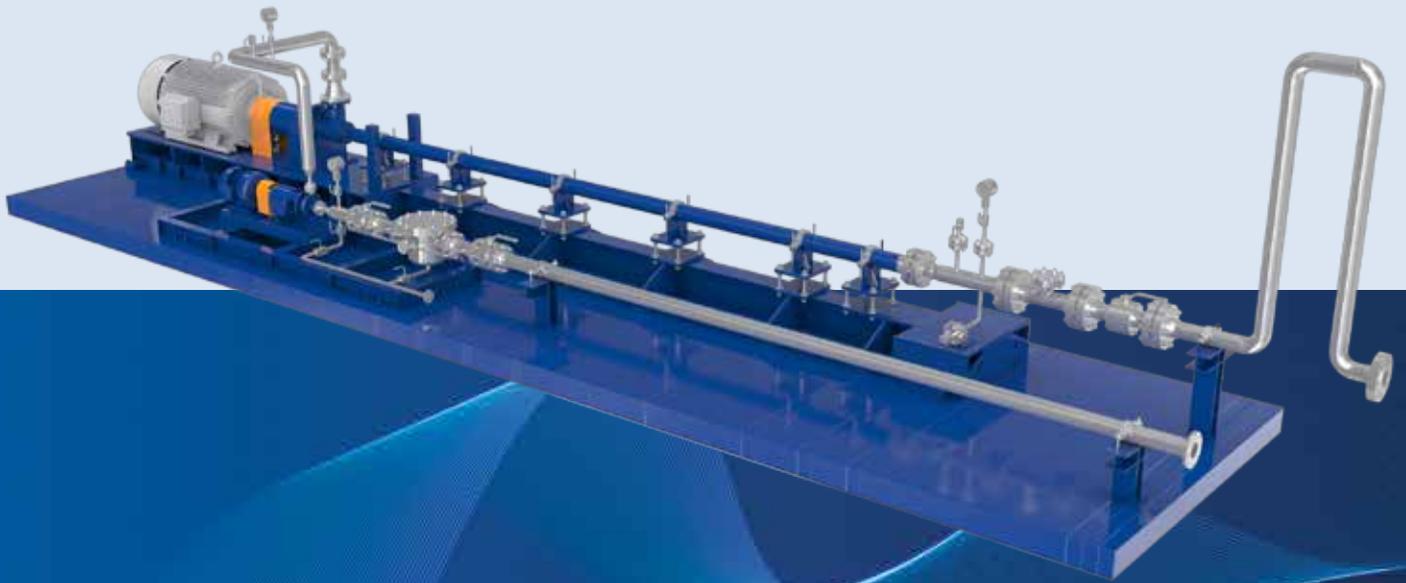




*Specialist for Pumping Technology*



# HTP

**Horizontal Turbine Pump**

# 70 years developing the pumping technology that drives progress

Ruhrpumpen is an innovative and efficient pump technology company that offers highly engineered, custom made solutions for oil & gas, chemical processing, power generation, industrial applications and water.

Implementation of cutting-edge technology and world-class engineering, combined with our unique vertically integrated structure, allows Ruhrpumpen to design complex technical solutions, creating the most robust and powerful pump systems in the marketplace.

Our broad product line complies with the most demanding quality standards and industry specifications such as **American Petroleum Institute (API)**, **American National Standards Institute (ANSI)**, **Underwriter's Laboratories (UL)**, **Factory Mutual (FM)**, **National Fire Protection Association (NFPA)**, **ISO and Hydraulic Institute**.

### Products include:

- Single stage overhung pumps
- Vertical in-line pumps
- Single and multi-stage between bearing pumps
- Multi-stage vertical pumps
- Reciprocating plunger pumps
- Sealless magnetic drive pumps
- Fire protection systems
- Pitot tube pumps
- Hydraulic decoking systems
- Horizontal pumping systems



### Ruhrpumpen is your single source supplier

- Original Equipment
- Spare parts
- Installation and startup support
- Repair and maintenance
- Engineering, training and consulting
- Reverse engineering

### Benefits of our pumps:

- Proven reliability
- High efficiency designs ensure lowest operating cost
- Robust design allows for long system life with minimal maintenance
- Optimized total cost of ownership

### HTP Pump

The HTP has been designed taking in consideration the vast experience of the company developing specific hydraulics engineering to generate the best high pressure horizontal pumping systems while delivering shorter lead times and industry leading field servicing.

The system design is based on our proven high efficiency centrifugal multistage configuration already in use in thousands of industry applications. The multistage centrifugal pump is mounted securely on a very rigid modular skid, powered by a motor, and protected by a reliable and robust thrust chamber.

Ruhrpumpen HTP systems are available in surface configurations with production ranges from 150 to 120,000 barrels per day. With this technology Ruhrpumpen became a global pumping manufacturing company with the full range of product offering including HPS and a wider portfolio, with a safe, effective, and offer flexible design options to meet the full spectrum of customer's surface pumping requirements around the globe.



## Features and Benefits

### Features

### Benefits

#### Efficiency - Power Utility Cost

- Industry leading high efficiency stages allow for lower power consumption, which results in lower cost of operation for the customer over the life of the pump.
- As a proven supplier of a full API-610 & PD product line, we are taking our proven hydraulics from VTL/VTP pumps and easily adapt them to develop a HTP pump type that will have industry leading efficiencies with a range of 2-5% above actual market, to reduce customer cost of pumping.

#### Low Maintenance - Operating Costs

- HTP units are virtually free maintenance units with a minor required routine for changing the oil in the thrust chamber, expending just a couple of hours. Low maintenance represents low cost and high availability of the pump running most of the time.

#### Capital Expense

- Extremely competitive pricing for the HTP pumps allows for low initial investment.

#### Delivery Time

- Manufacturing time frames will be dramatically lower as Ruhrpumpen has the complete in house capabilities for own foundry casting material, machining, assembly and factory test processes.

#### Environmental Friendly

- HTP units does not required hi volume of oil to operate, motors are typically electrical, and there are not burning lubricants, not waste generated, not contaminating fluids going to the environment. HTP does not generate negative impact to the location where is installed. Layout is clean and free of wastes.

#### Low Vibration and Noise

- Low vibration reduce mechanical failures, low noise prevent human negative impact and does not require major civil work and infrastructure to mitigate noise acceptable levels. Pulsation, noise and vibration free.

#### Flexibility

- HTP is a system easy to deal with. The unit is easy to install, it does not require major civil work, and it is modifiable and adaptable for changing operation conditions. It is easy to adapt for new operating conditions if is required.

#### Reliability

- Reduced failure rate. There are not gear boxes or v-belts for motor connection. Direct electric motor connection to the bearing frame. Number of wearing components reduced.

#### Simplicity

- Suction chamber contain a single mechanical seal subjected to suction pressure. Fluids are contain with the usage of an API mechanical seal and adjustable according to customer requirements. Variety of mechanical seals models and flush plans.

# Horizontal Turbine Pump - HTP

## Features

## Benefits

### Upgradable

- Parallel configuration for higher pumping capacities and adaptive operation. It is possible to install several HTP pumps in parallel to increase pumping capacity under the same site location. Just with the simple fact of adding pumps, customer may increase the pumping needs.

### Run Life

- Improved run life and performance in the presence of abrasive solids and scale/asphaltenes, due multiple own casting materials for pump stage metallurgy options.

### Special Materials

- For special applications HTP are available with several casting materials such as duplex or super duplex, with significant reduced lead times in about 20-30% less than typical market offering, due Ruhrpumpen own foundry capabilities for those metallurgies.

### Pressure Rating Options

- RP offers a differentiated product line for low pressure and high pressure applications. Using proven configuration from VTL/VTP pumps, low pressure product line will be configured with not housing, reducing lead times, associated costs and not overbuilt, designed fit for purpose. High pressure product line will be configured with housing materials rated up to 6000 psi.

### High Volume

- As the volume demands for fluid pumping is higher every day, Ruhrpumpen HTP systems are designed for hi volume applications using bigger outside diameters than those typical available in the market. Bigger pumps will be configured with 15" OD and higher, to accommodate very high flow rates over 120.000 bpd per pump model.

## Markets and Applications



### Oil & Gas

- Water disposal
- ALS with Jet pump
- Oil boosting
- Pipeline pump
- CO<sup>2</sup> injection
- Steam injection
- Boiler feeder
- Amine transportation
- EOR



### Mining

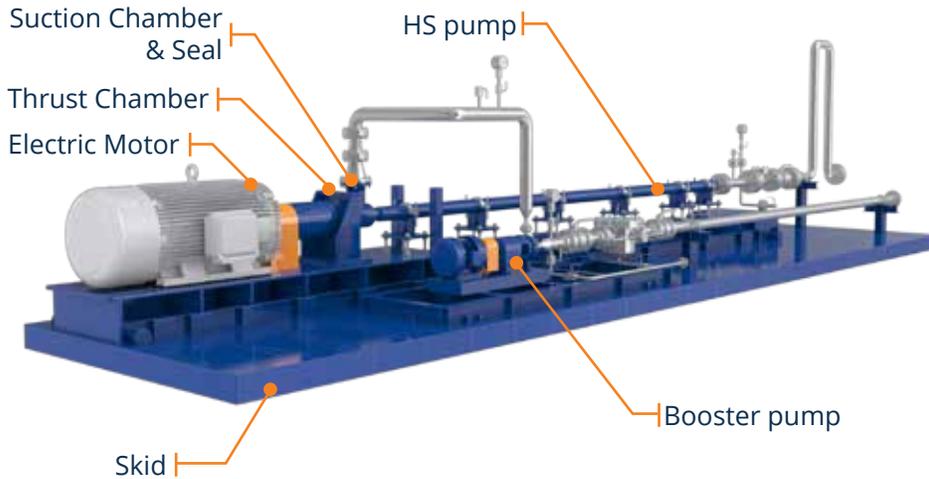
- Mining dewatering
- CBM well dewatering
- CBM injection water
- Pumping cooper brine
- Pumping sea water
- Process pump



### General Industry

- Industrial Process Fluids
- Reverse Osmosis
- Geothermal Injection
- Wash - down
- De - scaling
- Effluent Disposal
- Pipeline Booster
- High Pressure Transfer

## HTP Operating Range and Components



### OPERATING LIMITS

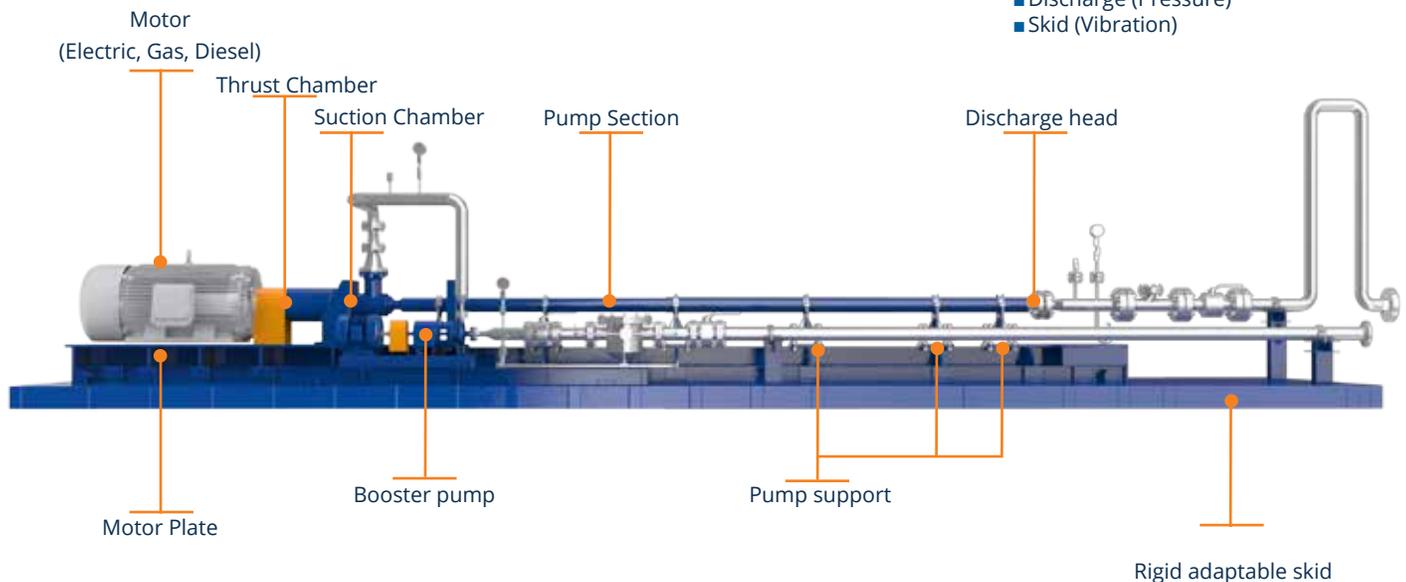
Duty Point	Min	Max
Flow	200 bpd	120 k bpd
Discharge Pressure	200 psi	6,000 psi
Suction Pressure	10 psi	3,000 psi

### Motor Options

Electric 50/60 Hz	75 HP	2,500 hp
Velocity	Fixed	Variable
Engine (*)	Gas	Diesel

(\*) Require Velocity Increaser (Gear box)

## Pump Section



### System Instrumentation

- Motor (Temperature, Vibration)
- TC & SC (Pressure, Temp, Vibration)
- Discharge (Pressure)
- Skid (Vibration)

## Pumping Element

### Features

### Benefits

#### Rapid Installation and Repair

- Replaceable on site with minimal down-time.

#### Utility cost

- Industry leading proven hydraulic designs are highly efficient.

#### Configuration

- Compression style for abrasion resistance.

#### Efficiency - Abrasive Fluids

- Mixed flow stages for high efficiency and wear resistance.

#### Radial Stabilization - Durability

- Tungsten carbide bearings/sleeves available.

#### Variety of Materials

- Various coatings, corrosion resistant materials, duplex, super duplex and diffusion processes available to meet application requirements.

# Horizontal Turbine Pump - HTP

## Components HTP System

Driver from 75 HP to 3,000 hp

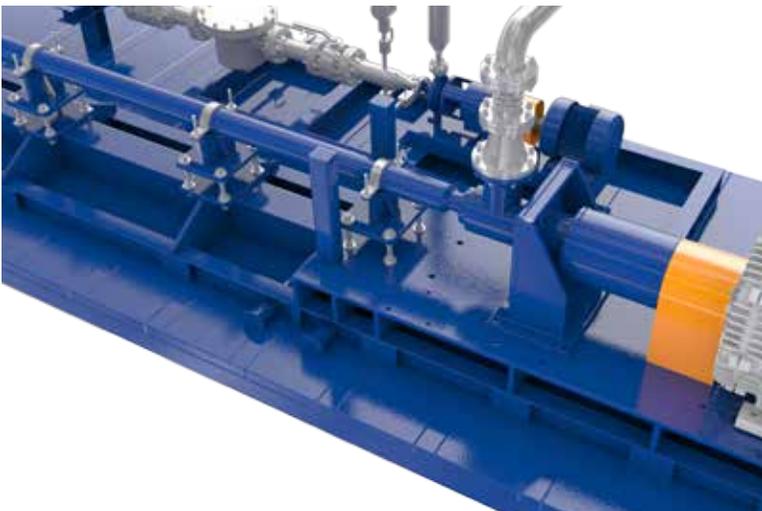
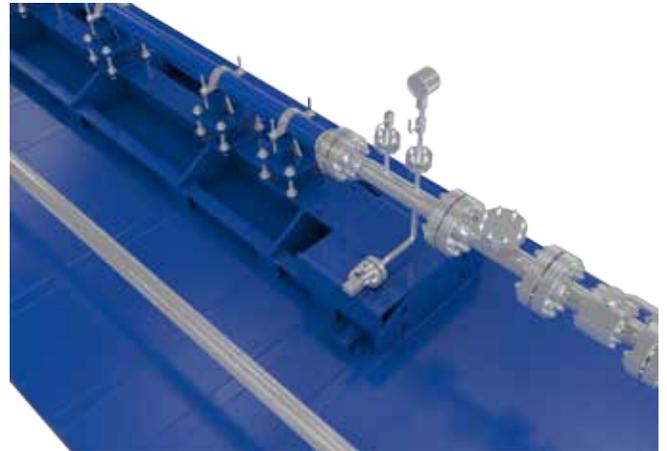


Frequency	60 Hz	50 Hz
RPM, 2 poles	3,600 rpm	3,000 rpm
Low Voltage	460 - 480 v	380 - 415 v
Medium Voltage	2,300 - 4,160 v	1,000 - 3,000 v
Design	Nema	I.E.C.

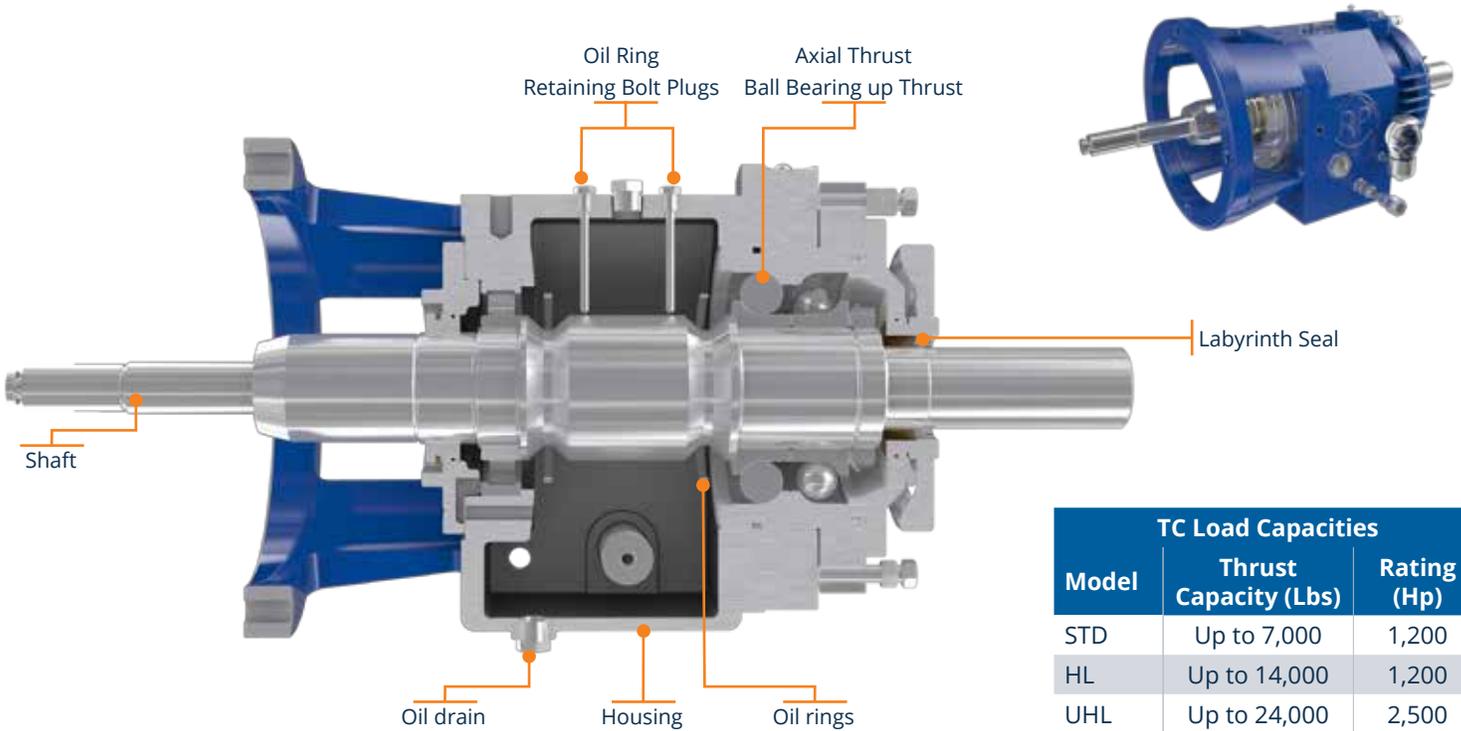
Almost any customer needs for driver type Industry Standard 2 pole NEMA and IEC foot mounted electric motors, typically used to comply customer requirements such as: enclosure type, voltage, frequency, insulation class, hazardous areas, among others. Additional drive options available include PMM, gas or diesel engine with speed increasers.

## Skid Frame

- Rigid design for smooth operation, **not vibration**, ease of installation & start-up
- Ability to **change motor size** without cutting metal or changing pipework height
- **Adaptable design**, Simple to add or subtract stages/ pumps
- Skid **re-usable** for future applications



## Thrust Chamber

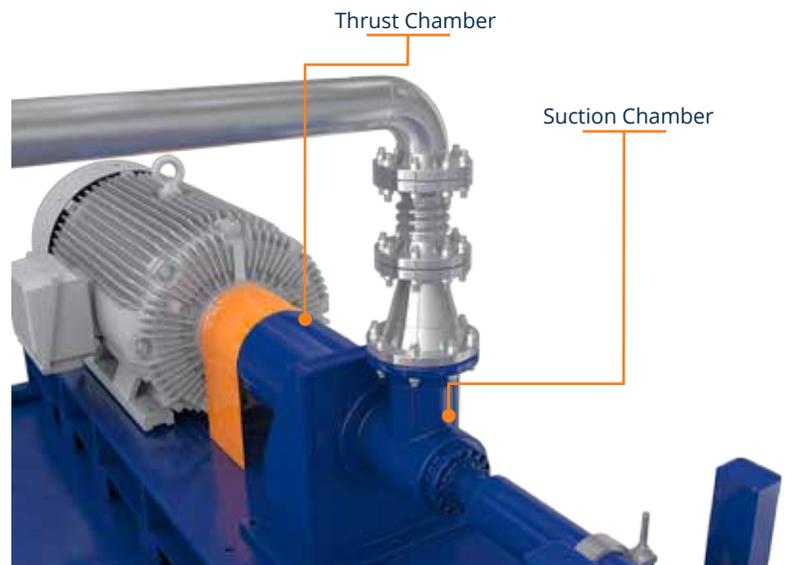


TC Load Capacities		
Model	Thrust Capacity (Lbs)	Rating (Hp)
STD	Up to 7,000	1,200
HL	Up to 14,000	1,200
UHL	Up to 24,000	2,500

- Replaceable module - with minimal downtime
- Simple design with low number of moving parts
- Minimal routine maintenance (2000 hr oil change)
- 0.5 gal reservoir & Oil rings for low temp rise
- Labyrinth seals used to eliminate shaft wear
- Predictable bearings life. TC's endurance tested, minimum life for given pump/stage combination known

## Suction Chamber

- Open free flowing area, for optimum suction capability and seal life
- Silicone carbide mechanical seal faces
- Mech seal operates at suction pressure
- Stub shaft optional design for easy seal & shaft change-out (thrust chamber exchange not required)
- Cartridge seal options API682 and most API610 flush & quench plans are available
- Front pull-out option design allows seals to be replaced without affecting alignment



# Horizontal Turbine Pump - HTP

## A) Intake and Suction Flange

Available in sizes, materials, pressures and temperature ratings suitable for its applications. Standard flanges ANSI B16.5 Class 150 to 2500. Additional special connections and flanges are available as customer specifications.

## B) Mechanical Seal

Front pull-out. Remove pipe spool piece. Move pump to access seal from front of suction chamber. Bearing housing remains in-site. No need to re-align motor coupling etc

## C) Discharge Flange

Available in sizes, materials, pressures and temperature ratings suitable for its applications. Standard flanges ANSI B16.5 Class 150 to 2500. Additional special connections and flanges are available as customer specifications.

## D) API Flush Plan Containment System

API specification compliant seals and flush plans available, including plans 11, 21, 31, 32, among others, and as per customer specific requirements.



## Instrumentation

Standard instrumentation HPS Ruhrpumpen package includes:

- Suction and Discharge Pressure transmitters and control Switches
- Vibration Switches for Motor and Skid
- TC Oil Temperature and Level
- Coolers signals (Hi-Load TC)
- Junction Box for single point wiring (Standard and XP enclosures)



# +65 years creating the pumping technology that moves our world

Ruhrpumpen is an innovative and efficient pump technology company that offers highly-engineered and standard pumping solutions for the oil & gas, power generation, industrial, water and chemical markets. We offer a broad range of centrifugal and reciprocating pumps that meet and exceed the requirements of the most demanding quality specifications and industry standards such as API, ANSI, UL, FM, ISO and Hydraulic Institute.



## Ruhrpumpen Plants

-  ARGENTINA, Buenos Aires
-  BRAZIL, Rio de Janeiro
-  CHINA, Changzhou
-  EGYPT, Suez
-  GERMANY, Witten
-  INDIA, Chennai
-  MEXICO, Monterrey
-  RUSSIA, Moscow
-  UK, Lancing
-  USA, Tulsa



*Manufacturing plant & service center*



*Service center*

- Antofagasta, Chile*
- Baton Rouge, USA*
- Bogota, Colombia*
- Buenos Aires, Argentina*
- Coatzacoalcos, Mexico*
- Hampton, USA*
- Houston, USA*
- Rio de Janeiro, Brazil*
- San Luis Potosi, Mexico*
- Santiago, Chile*